

C2  
CONT

5. (Amended) An apparatus as claimed in claim 4, wherein the means for delivering the substance is adapted to deliver the substance to the nasal airways of the human or animal.

---

C3

7. (Amended) An apparatus as claimed in claim 1, wherein the means for detecting inhalation includes an airflow sensor adapted to measure a volumetric flow rate of the breathable gas passing through a flexible conduit in fluid communication with a pressurized gas flow generator and a mask adapted to be worn by the human or animal and being adapted to generate a first input signal indicative of the breathable gas flow rate.

---

8. (Amended) An apparatus as claimed in claim 7, further including an amplifier to amplify the first input signal into a second input signal also indicative of the breathable gas flow rate.

---

C4

10. (Amended) An apparatus as claimed in claim 7, wherein the airflow sensor is adapted to be disposed downstream of a gas washout vent to atmosphere of the mask such that inhalation can be detected by sensing a reversal of the direction of the breathable gas flow through the vent.

---

11. (Amended) An apparatus as claimed in claim 10, wherein the airflow sensor is adapted to detect inhalation by sensing an interruption of the breathable gas flow through the vent.

---

12. (Amended) An apparatus as claimed in claim 1, further including means for measuring the volume of the substance to be delivered to the human or animal.

---

13. (Amended) An apparatus as claimed in claim 1, wherein the means for continuously measuring the pressure is a pressure transducer adapted to be connected to a conduit in fluid communication with a pressurized gas flow generator and a mask adapted to be worn by the human or animal, said transducer being adapted to generate a fourth input signal indicative of the pressure of the breathable gas in the conduit.

C4  
Cont

14. (Amended) An apparatus as claimed in claim 13, including an amplifier to amplify the fourth input signal into a fifth input signal also indicative of the breathable gas pressure.

15. (Amended) An apparatus as claimed in claim 1, wherein the means for delivering a substance is a positive displacement pump.

---

C5

18. (Amended) An apparatus as claimed in claim 16, wherein the diaphragm pump is adapted to be in fluid communication with the gas supply conduit via a one-way valve adapted to allow the substance to only pass from the diaphragm pump to the conduit.

19. (Amended) An apparatus as claimed in claim 16, wherein the diaphragm pump is displaced by a linear drive.

20. (Amended) An apparatus as claimed in claim 19, wherein the linear drive is an electromagnet.

21. (Amended) An apparatus as claimed in claim 16, wherein the diaphragm of the diaphragm pump is displaced by a rotary to linear converter driven by a rotary drive.

22. (Amended) An apparatus as claimed in claim 21, wherein the rotary drive is one of an electric DC motor, an electric AC motor, a stepper motor and a brushless motor.

23. (Amended) An apparatus as claimed in claim 19, further including a first control system having input means for allowing the input of a predetermined sixth input signal indicative of the volume of the substance to be delivered and a predetermined seventh input signal indicative of the pressure difference by which the pressure of the delivered substance should exceed the pressure of the supplied breathable gas, said first control system being adapted to receive the second, third, fifth, sixth and seventh input signals and calculate and generate a first output signal indicative of the amount of displacement of the linear drive or the rotary drive and a second output signal indicative of the direction of the displacement required to produce a negative or positive pumping pressure.

C5  
cont

24. (Amended) An apparatus as claimed in claim 23, wherein a negative pumping pressure draws the substance from the substance reservoir into the pump and a positive pumping pressure expels the substance from the pump to a flexible conduit and so to a mask in fluid communication with the conduit and adapted to be worn by the human or animal.

25. (Amended) An apparatus as claimed in claim 24, wherein the first and second output signals are sent to a second control system adapted to convert them into third and fourth output signals indicative of the linear drive or the rotary drive displacement and direction respectively, the third and fourth output signals being compatible with the linear drive or the rotary drive.

27. (Twice Amended) A method of delivering a substance to a human or animal being supplied with breathable gas pressurized above atmospheric pressure, the method including:

continuously measuring the pressure of a supplied breathable gas;

detecting inhalation by the human or animal; and

delivering a substance to the human or animal during an inhalation at a pressure that exceeds the pressure of a supplied pressure of the breathable gas by a predetermined pressure difference.

C6

33. (Amended) A method as claimed in claim 27, including measuring the volumetric flow rate of the breathable gas with an airflow sensor and generating a first input signal indicative of the breathable gas flow rate.

34. (Amended) A method as claimed in claim 33, including amplifying the first signal into a second signal also indicative of the breathable gas flow rate.

35. (Amended) A method as claimed in claim 33, including differentiating the first signal into a third signal indicative of breathable gas acceleration or deceleration to indicate inhalation or exhalation respectively.

C 6  
cont!

36. (Amended) A method as claimed in claim 27, including measuring the volume of the substance to be delivered to the human or animal.

---

C 7

38. (Amended) A method as claimed in claim 37, including amplifying the fourth input signal into a fifth input signal also indicative of the breathable gas pressure.

---

40. (Amended) A method as claimed in claim 39, wherein the positive displacement pump is a diaphragm pump.

---

C 8

41. (Amended) A method as claimed in claim 40, wherein the diaphragm pump is in fluid communication with a substance reservoir via a one-way valve adapted to allow the substance to only pass from the reservoir to the diaphragm pump.

---

42. (Amended) A method as claimed in claim 40, wherein the diaphragm pump is adapted to be in fluid communication with the gas supply conduit via a one-way valve adapted to allow the substance to only pass from the diaphragm pump to the conduit.

---

C 9

44. (Amended) A method as claimed in claim 43, wherein the linear drive is an electromagnet.

---

45. (Amended) A method as claimed in claim 40, wherein the diaphragm pump is displaced by a rotary to linear converter driven by a rotary drive.

---

46. (Amended) A method as claimed in claim 45, wherein the rotary drive means is at least one of an electric DC motor, an electric AC motor, a stepper motor and a brushless motor.

---

47. (Amended) A method as claimed in claim 43, further including inputting the second, third, fourth, fifth input signals and a predetermined sixth input signal indicative of the volume of the substance to be delivered and a predetermined seventh input signal indicative of the pressure difference by which the pressure of the delivered substance should

C9  
cont

exceed the pressure of the breathable gas into a first control means and the first control system adapted to generating a first output signal indicative of the amount of displacement of the drive means and a second output signal indicative of the direction of the displacement required to produce negative or positive pumping pressure.

---

C10

49. (Amended) A method as claimed in claim 48, further including inputting the first and second output signals into a second control system and the second control system converting them into third and fourth output signals indicative of drive means displacement length and direction respectively, the third and fourth output signals being compatible with the linear or rotary drive means.

---

See the attached Appendix for the changes made to effect the above claims.

Please enter the following new claims 50-74:

---

C11

50. (New) A substance delivery apparatus for use with a system for supplying breathable gas pressurized above atmospheric pressure to a human or animal, the apparatus including:

a pressure transducer to continuously measure pressure of a supplied breathable gas;  
an airflow sensor to detect inhalation by the human or animal; and  
a positive displacement pump to deliver a substance to the human or animal during the inhalation at a pressure that exceeds the measured pressure of the supplied breathable gas by a predetermined pressure difference.

51. (New) An apparatus as claimed in claim 50, wherein the substance is a medicinal substance.

52. (New) An apparatus as claimed in claim 50, wherein the substance is in the form of a gas, mist, aerated suspension, jet, spray, gas mixture or the like.

53. (New) An apparatus as claimed in claim 50, wherein the substance is delivered to the respiratory system of the human or animal.

54. (New) An apparatus as claimed in claim 53, wherein the substance is delivered to the nasal airways of the human or animal.

55. (New) An apparatus as claimed in claim 50, wherein the airflow sensor to detect inhalation further measures a volumetric flow rate of the breathable gas passing through a flexible conduit in fluid communication with a pressurized gas flow generator and a mask adapted to be worn by the human or animal, and generates a first input signal indicative of the breathable gas flow rate.

56. (New) An apparatus as claimed in claim 55, further including an amplifier adapted to amplify the first input signal into a second input signal also indicative of the breathable gas flow rate.

57. (New) An apparatus as claimed in claim 55, further including a differentiating filter adapted to derive the first signal into a third input signal indicative of acceleration or deceleration of the breathable gas to thereby indicate inhalation or exhalation respectively.

58. (New) An apparatus as claimed in claim 55, wherein the airflow sensor is disposed downstream of a gas washout vent to atmosphere of the mask such that inhalation can be detected by sensing a reversal of the direction of the breathable gas flow through the vent.

59. (New) An apparatus as claimed in claim 58, wherein inhalation is detected by sensing an interruption of the breathable gas flow through the vent.

60. (New) An apparatus as claimed in claim 50, further including signals indicative of the volume of the substance to be delivered to the human or animal.

61. (New) An apparatus as claimed in claim 50, wherein the pressure transducer is connected to a conduit in fluid communication with a pressurized gas flow generator and a mask adapted to be worn by the human or animal of the system for supplying breathable gas,

said transducer being adapted to generate a fourth input signal indicative of the pressure of the breathable gas in the conduit.

62. (New) An apparatus as claimed in claim 61, including an amplifier to amplify the fourth input signal into a fifth input signal also indicative of the breathable gas pressure.

63. (New) An apparatus as claimed in claim 50, wherein the positive displacement pump is a diaphragm pump.

64. (New) An apparatus as claimed in claim 63, wherein the diaphragm pump is in fluid communication with a substance reservoir via a one-way valve adapted to allow the substance to only pass from the reservoir to the diaphragm pump.

65. (New) An apparatus as claimed in claim 63, wherein the diaphragm pump is adapted to be in fluid communication with the gas supply conduit via a one-way valve adapted to allow the substance to only pass from the diaphragm pump to the conduit.

66. (New) An apparatus as claimed in claim 63, wherein the diaphragm pump is displaced by a linear drive.

67. (New) An apparatus as claimed in claim 66, wherein the linear drive is an electromagnet.

68. (New) An apparatus as claimed in claim 63, wherein the diaphragm of the diaphragm pump is displaced by a rotary to linear converter driven by a rotary drive.

69. (New) An apparatus as claimed in claim 68, wherein the rotary drive is one of an electric DC motor, an electric AC motor, a stepper motor and a brushless motor.

70. (New) An apparatus as claimed in claim 66, further including a first control system adapted to allow the input of a predetermined sixth input signal indicative of the volume of the substance to be delivered and a predetermined seventh input signal indicative

of the pressure difference by which the pressure of the delivered substance should exceed the pressure of the supplied breathable gas, said first control system being adapted to receive the second, third, fifth, sixth and seventh input signals and calculate and generate a first output signal indicative of the amount of displacement of the linear drive or the rotary drive and a second output signal indicative of the direction of the displacement required to produce a negative or positive pumping pressure.

71. (New) An apparatus as claimed in claim 70, wherein a negative pumping pressure draws the substance from the substance reservoir into the pump and a positive pumping pressure expels the substance from the pump to a flexible conduit and so to a mask in fluid communication with the conduit and adapted to be worn by the human or animal.

C" con'y  
72. (New) An apparatus as claimed in claim 71, wherein the first and second output signals are sent to a second control system adapted to convert them into third and fourth output signals indicative of the linear drive or the rotary drive displacement and direction respectively, the third and fourth output signals being compatible with the linear drive or the rotary drive.

73. (New) An apparatus as claimed in claim 72, wherein the input and output signals can be analog and/or digital.

74. (New) A substance delivery system for supplying breathable gas pressurized above atmospheric pressure to a human or animal, the system including:

a pressurized gas flow generator in fluid communication with a mask adapted to be worn by the human or animal via a flexible conduit;

a pressure transducer adapted to continuously measure the pressure of a supplied breathable gas;

an airflow sensor adapted to detect inhalation by the human or animal; and

a positive displacement pump adapted to deliver a substance to the human or animal during the inhalation at a pressure that exceeds the measured pressure of the supplied breathable gas by a predetermined pressure difference.